Leaflet 150 | Hindernisfreie Architektur – Die Schweizer Fachstelle | June 2021

The document reffers to Swiss standards!

Wheelchair-accessible charging stations

> Dimensioning, layout and equipment

Initial situation and development
Based on the federal government's climate objective, the switch to electro mobility is being promoted throughout Switzerland, and the infrastructure for charging electric vehicles is currently being developed. It must be equally available and accessible to persons using wheelchairs to avoid discrimination. For this purpose, the dimensioning of the charging stations must be coordinated with the company. Lack of standards for charging ports on vehicles and restrictions on movement areas due to cables increase the complexity of this task.

This leaflet supports planners and operators in choosing a suitable concept for planning and implementing obstacle clearance. It also provides the responsible authorities with important information for assessing building applications.

Guidelines and objectives
If charging stations are offered to the public, they must also be usable by people with disabilities without discrimination. This simultaneously increases the quality of use for all. For workplace and residential parking facilities, the principle of adaptability applies.

For the dimensioning and equipment of wheelchair-accessible charging stations, the basic requirements of the standards SIA 500 “Barrier-free buildings” and SN 640 075 “Barrier-free public space” are to be applied mutatis mutandis. Particular attention must be paid to the requirements for passage widths, for maneuvering areas in parking spaces and in front of control elements, and for the location and height of control elements. The application of these requirements is outlined in this leaflet.

> Concept for the realization of wheelchair-accessible charging

Range of wheelchair-accessible charging stations
An equal opportunity offer means that - as long as there are free spaces - a charging station suitable for wheelchair users is available. At full utilization, the waiting time for a free wheelchair-accessible station shall not be significantly longer than for any another charging station. To meet these requirements, a suitable concept must be applied.

A non-discriminatory offer can be guaranteed if, according to the "Design for all" principle, all charging stations are wheelchair accessible. For facilities with only a few charging stations, this is the only practical solution. If, for economic reasons or due to space constraints, only some of the charging stations are wheelchair-accessible (specific charging stations for wheelchair users), it must be ensured by means of signaling and/or operational measures (allocation of charging stations) that these stations are actually available when needed.

Structural requirements
Wheelchair-accessible charging stations have no steps or thresholds. The charging station has movement areas to reach the connections on the vehicle and the charger. Chargers and plugs can be operated while seated. The specific requirements are shown on pages 3 and 4. The following pages show conceptual solutions for wheelchair-accessible charging stations. For retrofitting existing parking facilities where the necessary spaces for wheelchair-accessible charging stations are not available, options with limited quality of use are described.

Planning and implementation
The following tables help to choose a suitable concept for the realization of equal opportunity offers for wheelchair users. For facilities that combine charging spaces for fast charging and parking with charging, wheelchair-accessible charging stations must be provided for both options.

Publicly accessible charging stations with long charging time (parking with charging)

Wheelchair-accessible solution "Design for all"	**R1**	all charging stations are dimensioned and equipped for wheelchairs
Specific wheelchair charging station	**S1**	For every 25 charging stations, at least one station is dimensioned and equipped for wheelchair users, marked with a wheelchair symbol and may only be used by authorized persons (disabled parking card).

Publicly accessible charging stations with short charging time (e-filling stations)

Wheelchair-accessible solution "Design for all"	**R1**	all charging stations are dimensioned and equipped for wheelchairs
	R2	Filling station design without defined areas, dimensioned and equipped for wheelchair users.
Specific wheelchair charging station	**S1**	For every 25 charging stations, at least one station is dimensioned and equipped for wheelchair users, marked with a wheelchair symbol and may only be used by authorized persons (disabled parking card).
Specific wheelchair-accessible charging station in facilities with space allocation [1]	**Z1**	For every 25 charging stations, at least one station is dimensioned and equipped for wheelchair users and is kept free in the system for authorized
	Z2	for every 25 charging stations, two are combined to form a wheelchair-accessible station that is kept free in the system for authorized persons[2]

Charging stations in residential buildings and buildings with workplaces (not open to the public)

Adaptability	**P1**	For all wheelchair-accessible parking spaces, adaptation with charging facilities is ensured if required.

1 The registration for the use of a charging station (e.g. via an app) is binding for all. The allocation of the charging station and the start of the charging process are coordinated.
2 The allocation of wheelchair-accessible charging stations to unauthorized persons will only take place when all other stations are already occupied. It must be possible to register for a wheelchair-accessible charging station on all linked reservation systems without additional effort.

> Movement areas at charger and vehicle

Movement areas

For the operation of the chargers and the various connections on the vehicles, as well as for getting in and out of the vehicle, appropriate movement areas must be available both at the charger and around the vehicle. The operation of the cable plug connections requires a lot of force, so that an optimal positioning of the wheelchair and thus a sufficient size of the movement areas for handling is necessary. By clearly marking the movement areas (e.g. with marking paint, as a restricted area) safety is increased when maneuvering around the vehicle.

Dimensioning of movement areas

> Width of the movement area around the charging bay min. 1.40 m
> Turning area for a 180° turn min. 1.40 m x 1.70 m
> Free areas of at least 0.70 m width and 1.40 m depth on both sides of the control panels to allow access to the charger and connection to the vehicle from both the left and the right side
> No posts (e.g. impact protection) within the movement areas
> The dimension of the charging bays is based on the standard VSS 40 291 “Arrangement and geometry of parking facilities”

Vehicle criteria

The position of the charging port on the vehicle varies depending on the manufacturer. To ensure that the appropriate connection point on the vehicle can be reached at a wheelchair-accessible charging station, movement areas must be provided at all standard connection points (A, B and C).

> A Connection points on the left side at the front or rear require a movement area on the driver's side, which is also needed for getting in and out.
> B Connection points at the front in the middle require a movement area in front of the vehicle.
Reverse parking is generally not suitable, as this makes access to the trunk difficult or impossible.
> C Connection points on the right-side front and rear require movement areas on both sides of the vehicle to ensure entry, exit and connection of cables

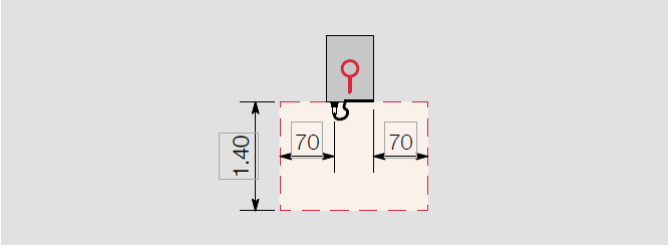


Fig.1 Charger with operation on one front

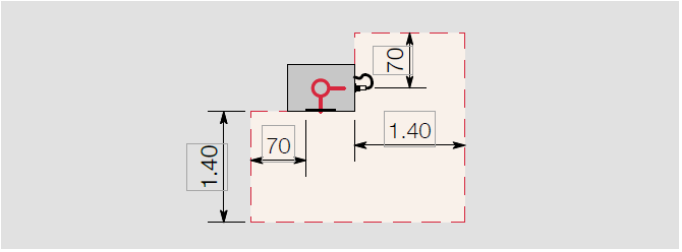


Fig.2 Cable holder and operation arranged at right angles

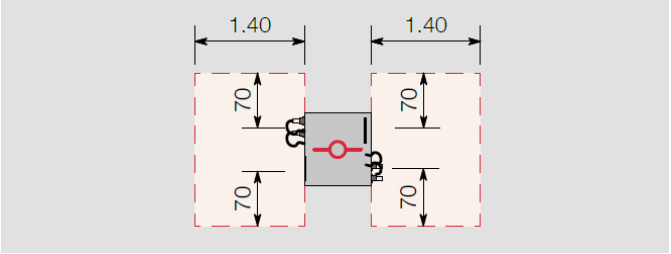


Fig.3 Double charger with opposite operation

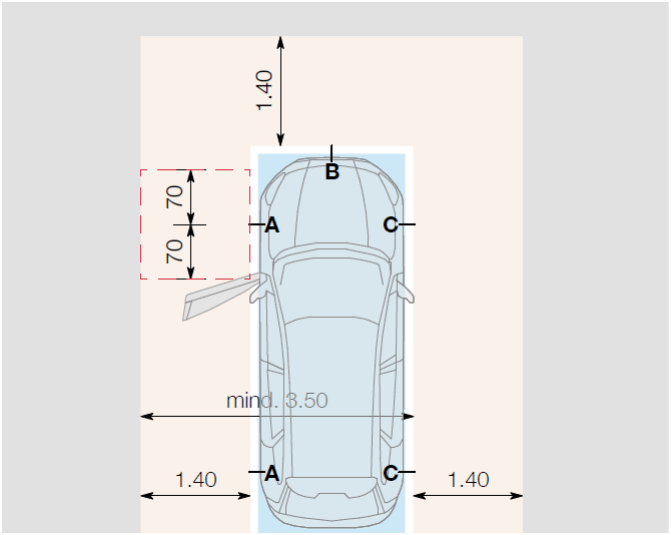


Fig.4 Movement areas around the charging bay

If inductive charging becomes the standard and is offered at most locations in the future, in the longer term the requirements for movement areas could be reduced to those of a wheelchair parking space. Solutions for retrofitting vehicles are already available today.

Flatness and trafficability of the charging bays

> charging bays are to be arranged level, drainage slope maximum 2%.
> access to the charging bay is without steps and landings; sidewalks in the street space are to be lowered in accordance with SN 640 075.
> Passages that are too narrow must be avoided or eliminated
> Floor coverings must meet the requirements of the SIA 500 standard in terms of trafficability, walkability and slip resistance

Impact protection

Posts as impact protection at chargers are always an obstacle. They interfere with movement areas and access to the charger, plus charging cables can get caught on the posts. If possible, posts should be avoided. Wheel stops on the charging bay are more suitable and preferable. Both wheel stops and any posts must not restrict the movement areas as per page 2.

Weather protection

According to the standard "SIA 500 Barrier-free buildings", wheelchair-accessible parking spaces "...preferably protected from the elements" must be provided. This also applies analogously to charging stations, since getting in and out and operating the devices requires a lot of time for wheelchair users.

Operation and operating height

> Cable supports and operating elements must be arranged at a height of 0.80 - 1.10m above the floor, the maximum operating height of 1.10m must not be exceeded even with a unit base
> Font size, brightness contrast and illumination are to be carried out according to SIA 500.
> By tilting the control elements by around 15° to the vertical, operation is optimized for use while standing and also while seated
> Operating elements set back from the front of the device or the movement area, e.g. payment terminal in a niche, are to be avoided (permissible according to standard SIA 500: max. 0.25 m)

Chargers

The choice of charger depends on the place of use and the desired power. The most common models are briefly explained below:

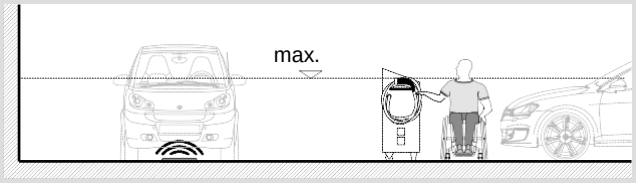
Charging station
> freestanding, size variable
> well suited for all outdoor charging areas

Wallbox
> space-saving wall mounting
> well-suited for existing parking garages, as well as for individual adaptations

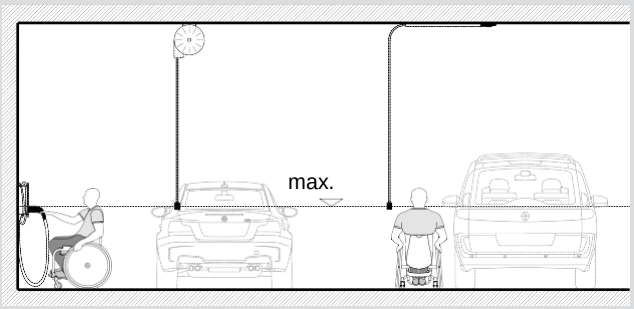
Ceiling charger (winch or swivel arm)
> space-saving solution
> well-suited for individual adaptations

Mobile chargers
> flexible use for multiple charging bays
> for example as charging station at hotel parking spaces

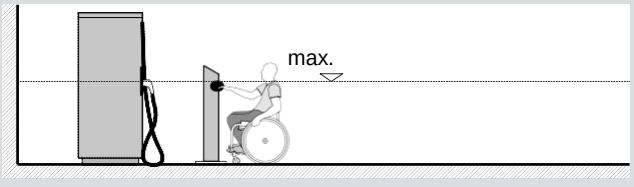
Inductive charging
> Particularly interesting for people with disabilities, as no handling of cables and plugs is necessary
> Appropriate technology also required on the vehicle (retrofitting possible)



Inductive charging in the floor, mobile charging station on castors



Charger as wallbox, charging cable on ceiling with winch or swivel arm



Maximum operating height 1.10 m, irrespective of the type of charger

Wheelchair-accessible charging station
Movement areas around the vehicle

This wheelchair-accessible arrangement is the preferred solution for electric filling stations and for parking spaces with charging facilities. When applied to all charging stations at a facility, it meets the equal opportunities requirements (R1). It is also suitable for specific wheelchair charging bays (S1, Z1) and is the ideal solution for retrofitting existing parking bays (S1, P1) provided that the movement areas can be made available.

> movement areas in front of the control elements of the charger with a minimum depth of 1.40m
> movement areas at the side of the charging bay at least 1.40 m wide
> charger with movement area can be positioned within the area marked with arrows
> double chargers for two charging bays possible in the area of the positions indicated in gray

Quality of use
> marking the movement areas around the vehicle ensures that there is sufficient space to enter and exit the vehicle and to operate the various vehicle connections

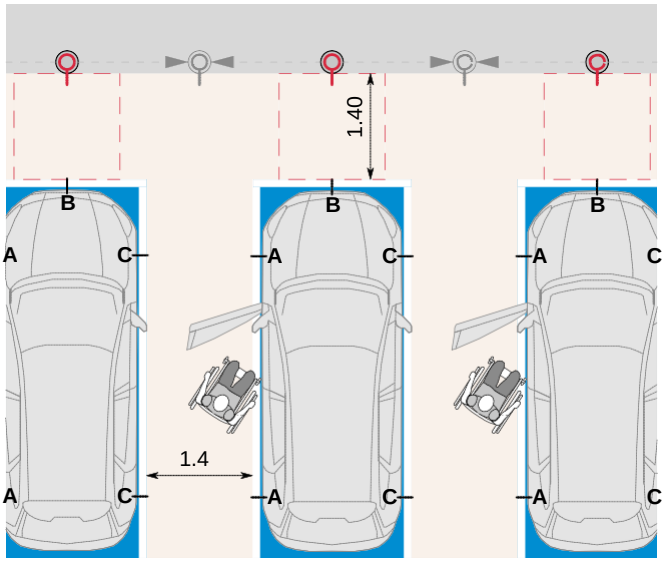


Fig.5 Wheelchair-accessible arrangement perpendicular to the roadway with movement areas around the vehicle

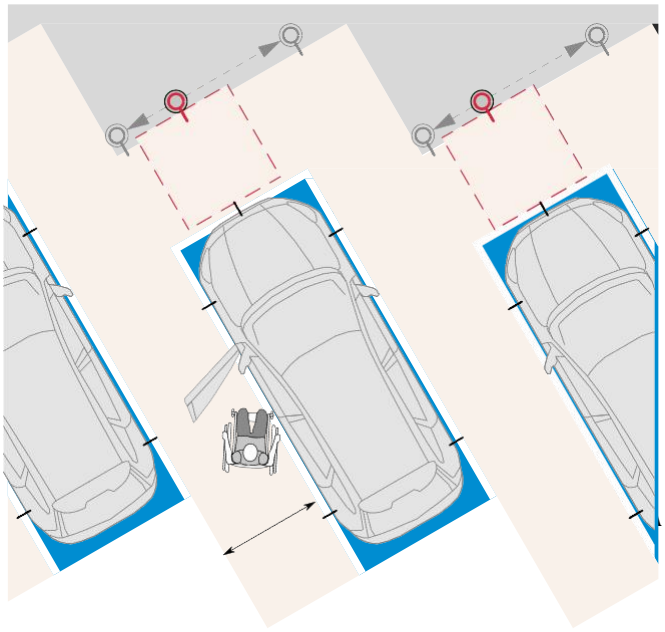


Fig.6 Wheelchair-accessible angled arrangement with movement areas around the vehicle

> Design of charging stations

Wheelchair charging station consisting of two charging bays

If it is not possible to dimension all the charging bays of a facility to be wheelchair-accessible, it is possible to combine two standard charging bays to form one wheelchair-accessible charging bay (Z2). With this solution, registration (e.g. via an app) and allocation of specific charging stations is essential. This ensures during ongoing operation that the wheelchair-accessible charging bays are kept free for those entitled to use them, i.e. that they are only assigned to other people when all others are already occupied. To prevent long waiting times, this variant is only suitable for short-term charging at e-fueling stations.

> width of the wheelchair charging bay min. 5.00m (2 individual loading bays with 2.50m each)
> two chargers with 0.70m distance to the lateral edge of the charging bay
> double devices arranged centrally are possible, provided that the movement area between the device and the charging bay is at least 1.40m deep.

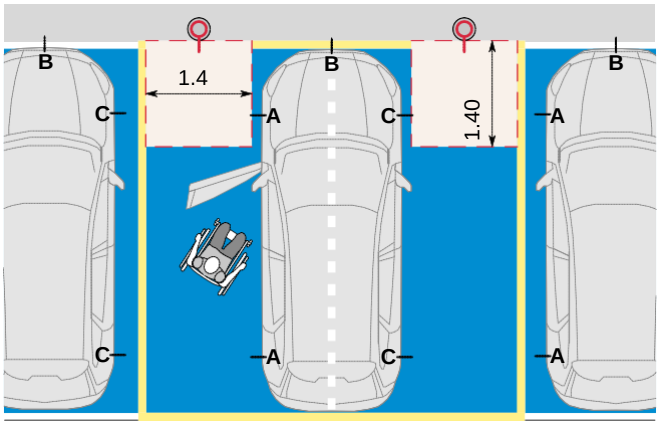


Fig.7 Wheelchair charging station consisting of two individual charging bays, allocation of bays essential during operation.

Quality of use

> Sufficient movement areas on both sides of the vehicle to get on and off the vehicle and for operating the vehicle connections A & C
> The person with the wheelchair positions his/her vehicle so that the movement areas are optimally adapted to the person‘s needs
> Connection point B can only be used to a limited extent depending on the length of the vehicle and the available movement area in front of the charging bay; it may be necessary to park backwards or diagonally for charging

Charging station; only limited accessibility with wheelchair

In existing facilities, it is not always possible to provide the maneuvering spaces in front of the vehicle (e.g. in parking garages). With the solution shown here, not all connection points on the vehicle are accessible for wheelchair users. It is therefore only suitable to a limited extent, i.e. only for existing facilities where a wheelchair-accessible charging bay with movement areas around the vehicle cannot be installed (S1, Z1).

> movement areas on both sides of each charging bay at least 1.40m wide and clearly marked, e.g. with marking paint
> position of the charger in the center of the movement area at the front end, e.g. as a wallbox. Larger chargers or those with control elements on two or more sides require additional movement areas
> double chargers possible at every second movement area

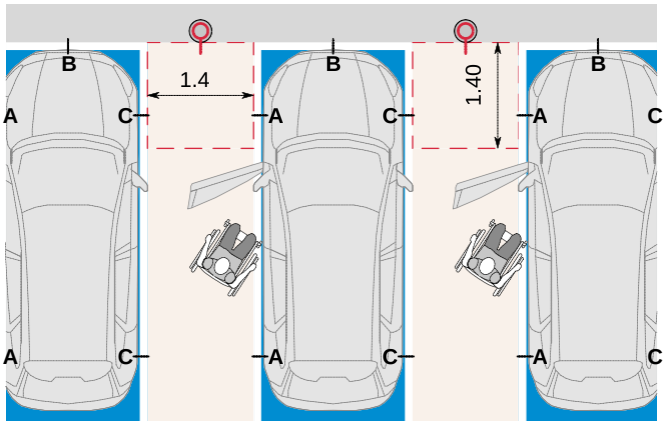


Fig.8 Conditionally wheelchair suitable with movement areas on the side.

Quality of use

> Marking the movement areas on both sides of the vehicle ensures that there is sufficient space to enter and exit the vehicle and to operate the vehicle connections A&C
> depending on the length of the vehicle, connection point B can only be reached by parking backwards and using the appropriate cable length, in which case access to the trunk is not possible

> Design of charging stations

Retrofitting of existing wheelchair parking spaces

If existing wheelchair parking spaces of 3.50m width are retrofitted with chargers, not all connection points are accessible depending on the position and type of charger. They are therefore only suitable to a limited extent for publicly accessible installations (S2). For individual adaptation at home or at work (P1), the ideal solution for the person concerned is selected. The use of inductive charging options improves the quality of use.

Possible positions of the charger and resulting restrictions:

- > Pos. I (wall mounting): Connections A accessible, connection B accessible for short vehicles, connections C not accessible
- > Pos. I (charging pole): only if the device does not restrict the movement area according to p.3 in front of connection A (front)
- > Pos. II (on wall or pole): connections A accessible, connection B accessible with reverse parking, connections C not accessible
- > Pos. III (ceiling mounting): connections A accessible, connection B accessible with reverse parking, connections C accessible to a limited extent if parking at a slight angle is possible.

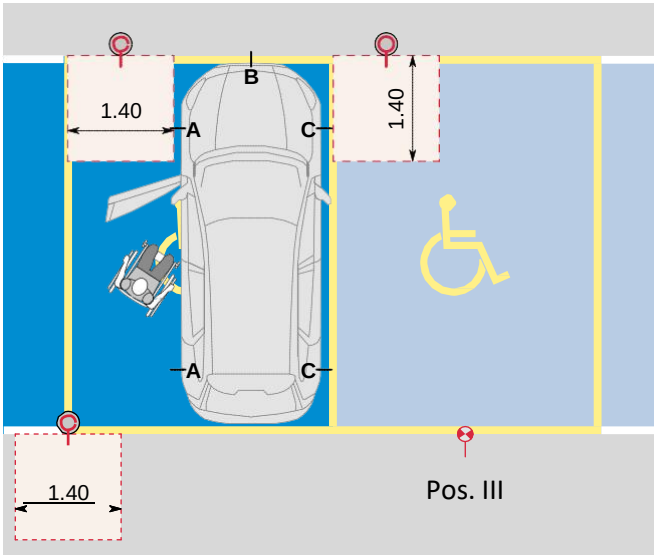


Fig.9 Retrofitting of existing wheelchair parking spaces with charging possibility

Quality of use

- > suitable as customized solution for a specific person, less suitable for changing users
- > in publicly accessible facilities only suitable to a limited extent, as usability is restricted

Wheelchair-accessible charging station along the roadway

Suitable for both e-charging stations and parking with charging in public spaces (R1, S1, S2, Z1) for new and existing facilities. The connection points C are operated from the sidewalk, the other connections from the roadway.

- > charging bay length for use with wheelchair min. 8.00 m (according to standard VSS 40 291)
- > charging bay at roadway level without ledge to the roadway (no sidewalk parking)
- > the movement area with a width of 1.40m next to the vehicle must be ensured outside the lane on busy roads
- > operating height of the charging station max. 1.10m from street level
- > access to the sidewalk by means of sidewalk lowering with low edge closure or punctual access ramps according to SN 640 075
- > slope of the sidewalk lowering as low as possible (movement surface as flat as possible)
- > double charging station possible at every second field
- > charging poles can be identified with the white cane, no protruding elements of the chargers on the sidewalk side

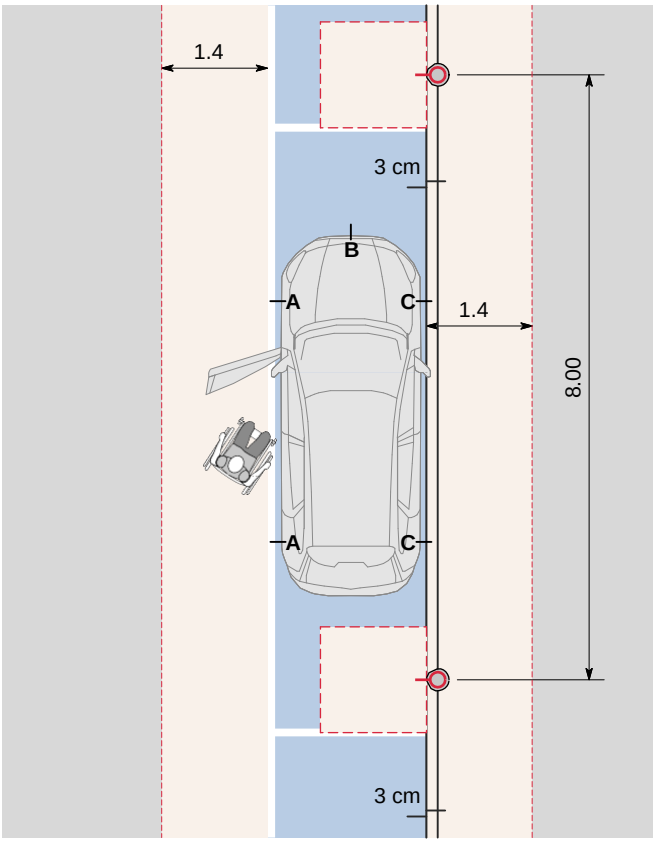


Fig.10 Parking field arrangement along the roadway, access to the sidewalk by means of punctual access ramp

> Design of charging stations

Filling station layout

E-filling stations (R2) can be designed analogously to conventional fuel filling stations without defined charging bays and movement areas. It is also possible that individual fuel dispensers could be replaced by chargers in the future without having to change the layout, provided that access and exit are not blocked by charging vehicles.

- > Width of the loading zones min. 3.50m
- > all operating elements and cables are located at a height of max. 1.10m above the floor and preferably at the front to the charging zone
- > an impact protection, e.g. a base, is possible on the side of the charging pole, provided that the pole does not have any operating elements on this side
- > if the chargers are arranged in-line, the distance between two charging poles is at least 8m in order to ensure the movement areas at the charger and at the possible connection points on the vehicle in any parking position.
- > the driving lane must be dimensioned in such a way that a vehicle can pass without restricting the movement area of the charging vehicles

Quality of use

- > all potential connections on the vehicle are easily accessible
- > sufficient movement areas around the vehicle and at the charger
- > usually protected from the weather

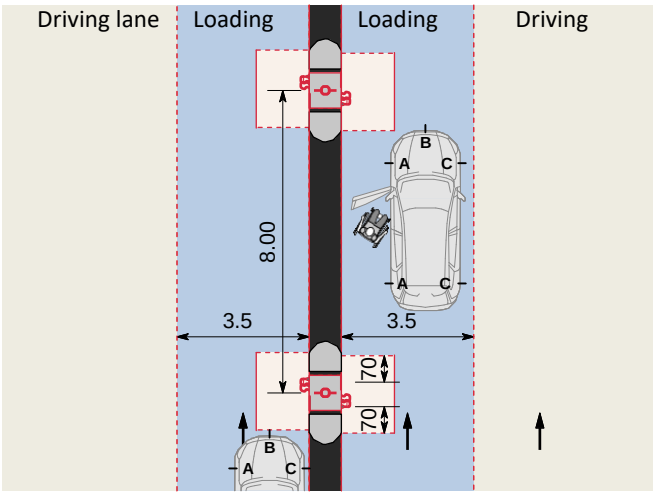


Fig.11 Filling station layout in-line

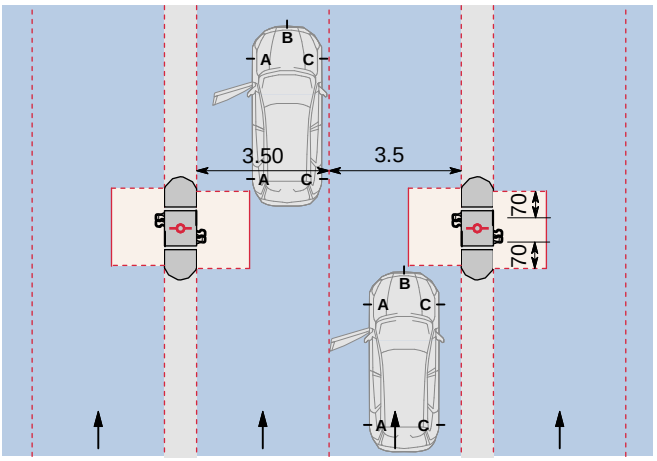


Fig.12 Filling station layout side by side

Standards

- > SIA 500 “Barrier-free buildings”
- > SN 640 075 “Barrier-free public space”
- > VSS 40 291 “Arrangement and geometry of parking facilities”

Further information and planning aids, as well as addresses of cantonal advisory offices:
www.hindernisfreie-architektur.ch